§ 230.114 Wheel centers.

(a) *Filling blocks and shims.* Driving and trailing wheel centers with divided rims shall be properly fitted with iron or steel filling blocks before the tires are applied, and such filling blocks shall be properly maintained. When shims are inserted between the tire and the wheel center, not more than two thicknesses of shims may be used, one of which must extend entirely around the wheel. The shim which extends entirely around the wheel may be in three or four pieces, providing they do not lap.

(b) *Wheel center condemning defects.* Wheel centers with any of the following defects shall be removed from service immediately and repaired:

(1) Wheels centers loose on axle;

(2) Broken or defective tire fastenings;

(3) Broken or cracked hubs, plates, bolts or spokes, except as provided in paragraph (b)(4) of this section; or

(4) Driving or trailing wheel center with three adjacent spokes or 25 percent or more of the spokes in the wheel broken.

(c) *Wheel center repairs.* Wheel centers may be repaired by welding or brazing provided that the defect can properly be so repaired and, following the repair, the crankpin and axle shall remain tight in the wheel. Banding of the hub is permitted.

(d) *Counterbalance maintenance.* Wheel counterbalances shall be maintained in a safe and suitable condition for service.

STEAM LOCOMOTIVE TANKS

§ 230.115 Feed water tanks.

(a) *General provisions.* Tanks shall be maintained free from leaks, and in safe and suitable condition for service. Suitable screens must be provided for tank wells or tank hose and shall be maintained in a manner that allows the unobstructed flow of water. Feed water tanks shall be equipped with a device that permits the measurement of the quantity of water in the tender feed water tank from the cab or tender deck of the steam locomotive. Such device shall be properly maintained.

(b) *Inspection frequency.* As often as conditions warrant but not less frequently than every 92 service days, the interior of the tank shall be inspected, and cleaned if necessary.

(c) *Top of tender.* Top of tender behind fuel space shall be kept clean, and means provided to carry off excess water. Suitable covers shall be provided for filling holes.

§ 230.116 Oil tanks.

The oil tanks on oil burning steam locomotives shall be maintained free from leaks. The oil supply pipe shall be equipped with a safety cut-off device that:

(a) Is located adjacent to the fuel supply tank or in another safe location;

(b) Closes automatically when tripped and that can be reset without hazard; and

(c) Can be hand operated from clearly marked locations, one inside the cab and one accessible from the ground on each exterior side of the steam locomotive.

APPENDIX A TO PART 230—INSPECTION REQUIREMENTS

The lists in this appendix are intended as guidance only. Adherence to this list does not relieve the steam locomotive owner and/or operator of responsibility for either: (1) Completing the inspection and maintenance requirements described in this part; or (2) ensuring that the steam locomotive, tender and its parts and appurtenances are safe and suitable for service.

Daily Inspection Requirements; § 230.13

1. Observance of lifting pressure of the lowest safety valve.
2. Testing of water glasses and gauge cocks.*
3. Inspection of tubular water glass shields.
4. Inspection of all cab lamps.*
5. Inspection of boiler feedwater delivery systems.*
6. Inspection of lagging for indication of leaks.
7. Inspection for leaks obstructing vision of engine crew.
8. Observance of compressor(s) and governor to ascertain proper operation.*
9. Inspection of brake and signal equipment.*
10. Inspection of brake cylinders for piston travel.
11. Inspection of foundation brake gear.
12. Inspection of sanders.*
13. Inspection of draw gear and chafing irons.

14. Inspection of draft gear.
15. Inspection of crossheads and guides.
16. Inspection of piston rods and fasteners.
17. Inspection of main, side, and valve motion rods.
18. Inspection of headlights and classification lamps.*
19. Inspection of running gear.
20. Inspection of tender frames and tanks.
21. Inspection of tender trucks for amount of side bearing clearance.

NOTE: All items marked (*) should be checked at the beginning of each day the locomotive is used.

31 Service Day Inspection Requirements; § 230.14

1. Washing of boiler.
2. Cleaning and inspection of water glass valves and gauge cocks.
3. Cleaning, washing and inspection of arch tubes, water bar tubes, circulators and siphons.
4. Removal and inspection of all washout and water tube plugs.
5. Testing of all staybolts.
6. Removal, cleaning and inspection of fusible plugs (if any).

92 Service Day Inspection Requirements; § 230.15

1. Removal and testing of all air and steam gauges.
2. Cleaning of steam gauge siphon pipe.
3. Renewal of tubular water glasses.
4. Testing and adjusting of safety relief valves.
5. Testing of main reservoir and brake cylinder leakage.
6. Entering and inspection of tender tank interior.

Annual Inspection Requirements; § 230.16

1. Testing of thickness of arch and water bar tubes (arch brick to be removed)
2. Hydrostatic testing of boiler.
3. Testing of all staybolts.
4. Interior inspection of boiler.
5. Thickness verification of dry pipes.
6. Smoke box inspection.
7. Main reservoir hammer or UT testing and hydrostatic testing (for non-welded and drilled main reservoirs)
8. Removal and inspection of steam locomotive drawbar(s) and pins (NDE testing other than merely visual)
9. Inspection of longitudinal lap joint boiler seams.

5 Year Inspection Requirements; § 230.16

1. Inspection of flexible staybolt caps and sleeves.

1472 Service Day Inspection Requirements; § 230.17

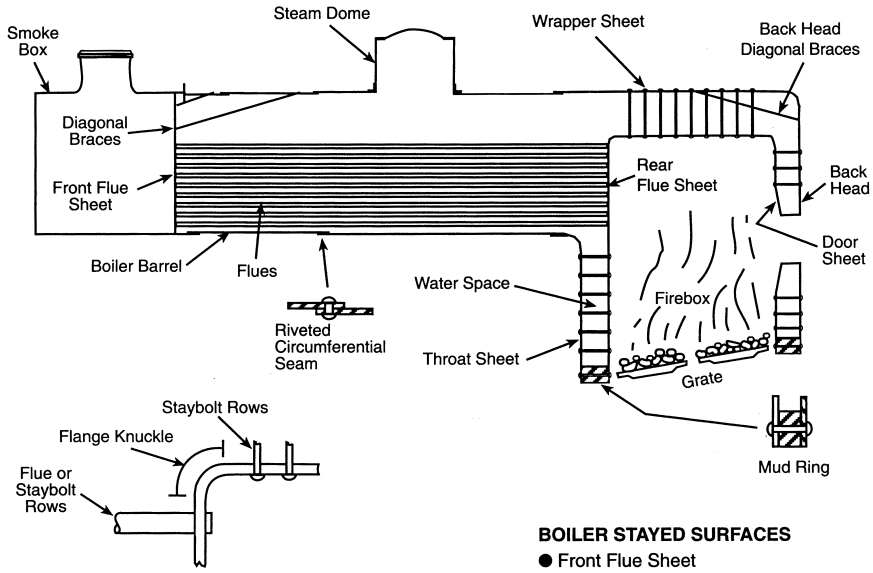
1. Removal of boiler flues (as necessary) and cleaning of boiler interior.
2. Removal of jacket and lagging and inspection of boiler interior and exterior.
3. Hydrostatic testing of boiler.
4. Thickness verification (boiler survey) and recomputation and update of steam locomotive specification card, (FRA Form No. 4).

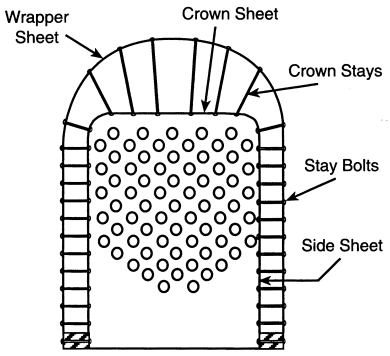
Appendix B to Part 230—Diagrams and Drawings

Reference 230.8
Drawing 1

BOILER: STAYED AND UNSTAYED SURFACES

Section Through Locomotive Boiler





SECTION THROUGH FIREBOX

BOILER STAYED SURFACES

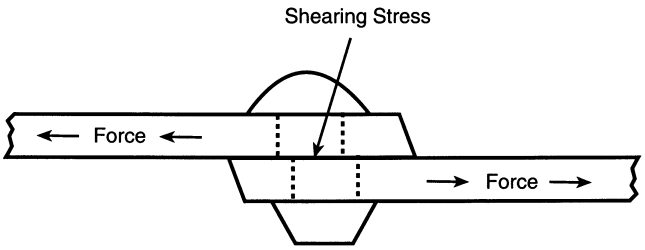
- Front Flue Sheet
- Rear Flue Sheet
- Wrapper Sheet
- Door Sheet
- Side Sheets
- Crown Sheet
- Throat Sheet
- Back Head
- Stayed Section of Thermic Syphons

BOILER UNSTAYED SURFACES

- Boiler Barrel
- Steam Dome
- Arch Tubes
- Thermic Syphon Neck
- Firebox Circulators
- Knuckle Section of Flanged Sheet

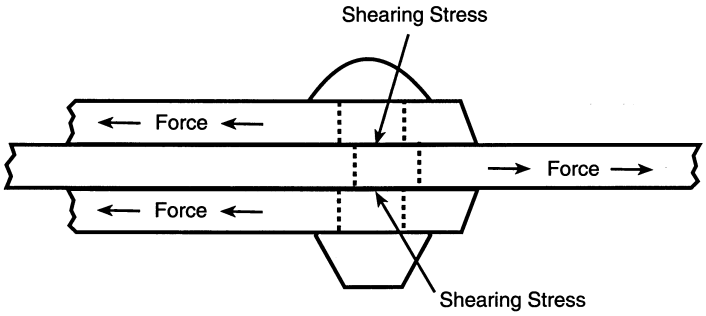
Reference 230.27
Drawing 2

RIVET IN SINGLE SHEAR



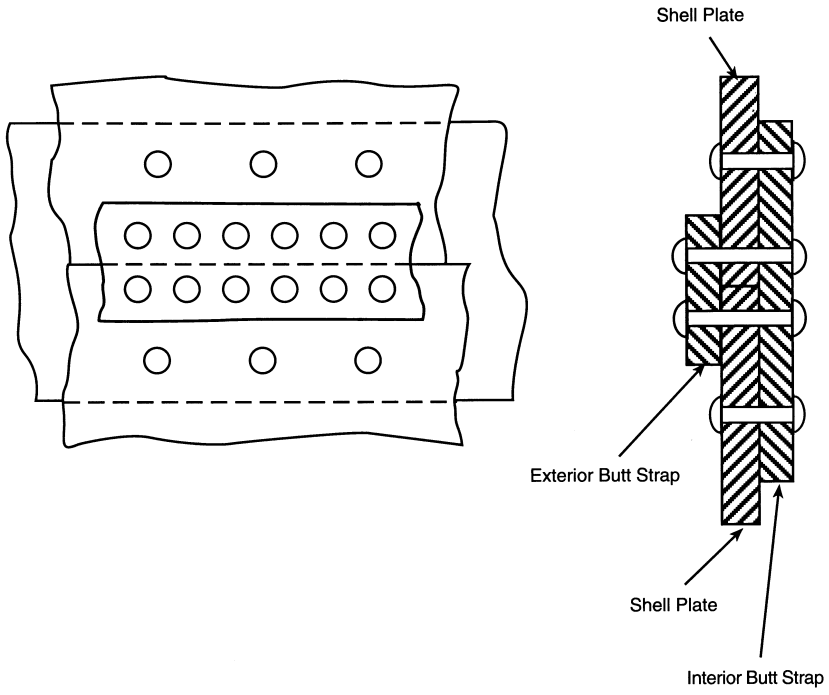
Reference 230.27
Drawing 3

RIVET IN DOUBLE SHEAR



Reference 230.34(b)
Drawing 4

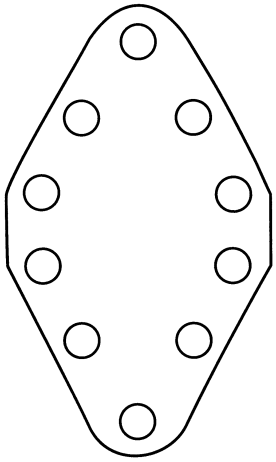
RIVETED BUTT SEAM



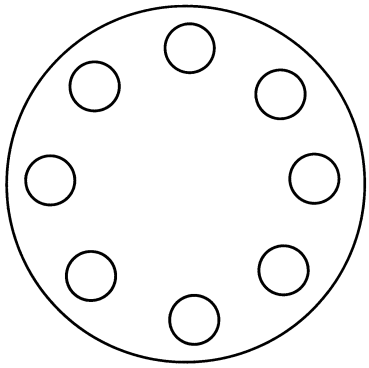
Reference 230.34(a)
Drawing 5

RIVETED BOILER PATCH

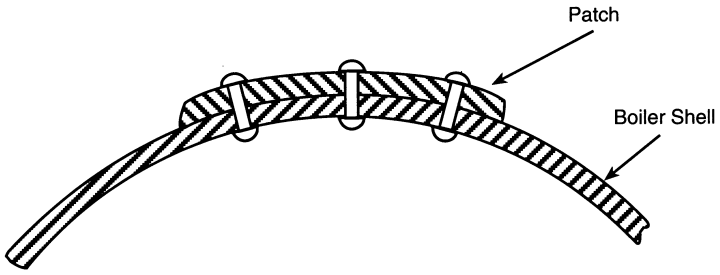
Diagonal Riveted Patch



Circular Riveted Patch



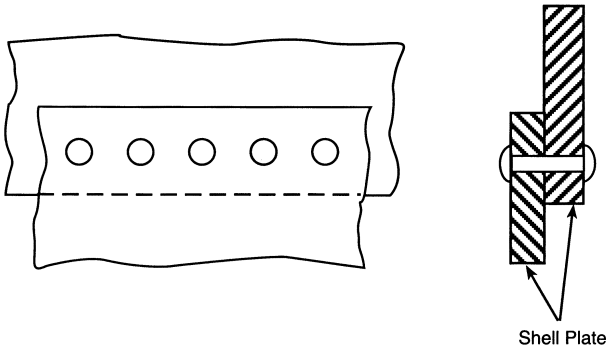
Typical Riveted Patch Installation



Patch may be installed on Boiler Shell Interior or Exterior

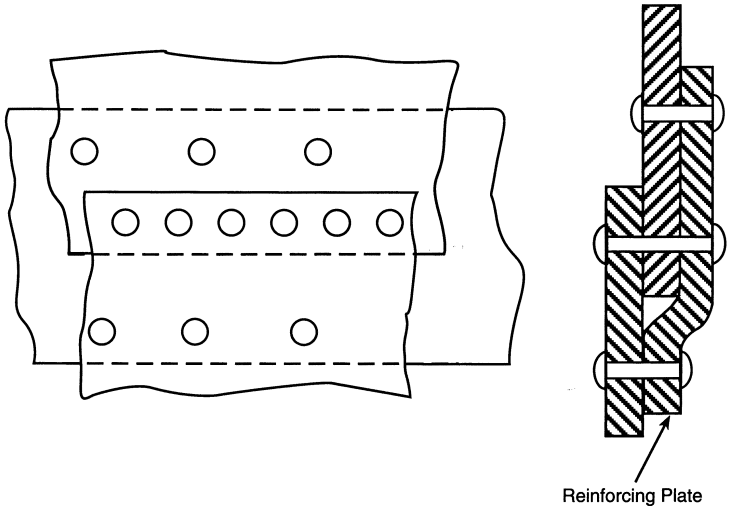
Reference 230.30
Drawing 6

RIVETED LAP SEAM



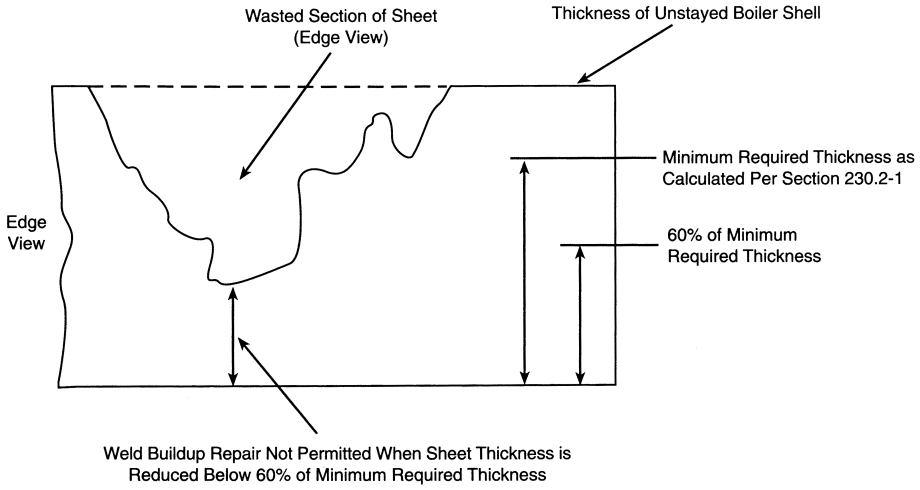
Reference 230.30
Drawing 7

RIVETED LAP SEAM WITH REINFORCING PLATE



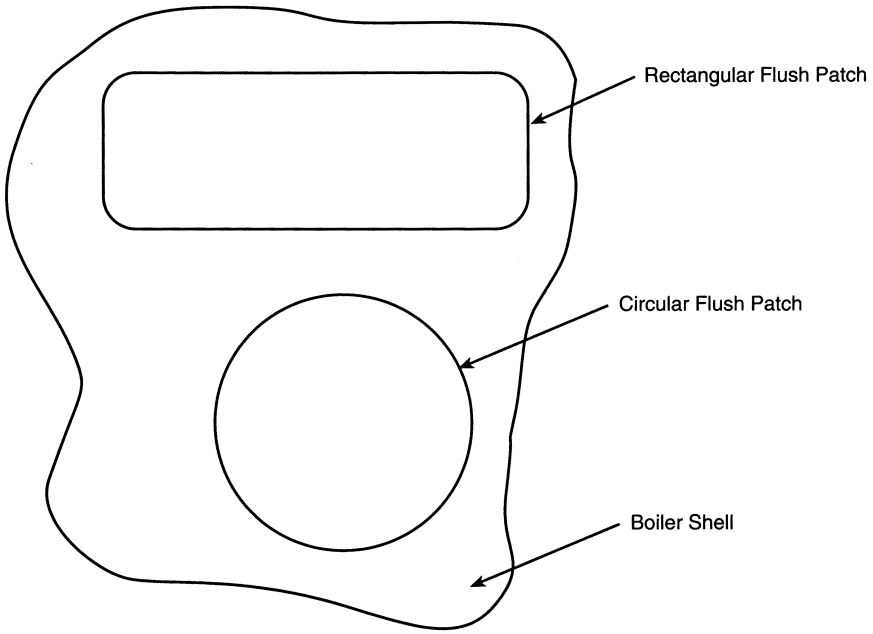
Reference 230.33(c)
Drawing 8

WELD BUILDUP REPAIR OF WASTED UNSTAYED BOILER SHEET

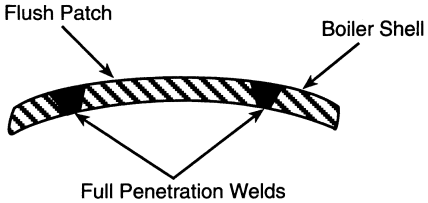


Reference 230.33(d)
Drawing 9

FLUSH PATCHES ON UNSTAYED SECTION OF BOILER SHELL

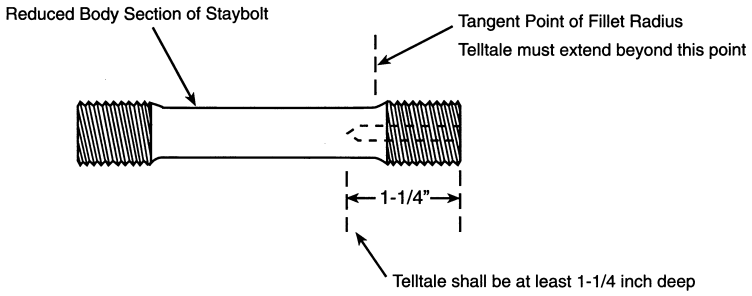


Typical Flush Patch Installation



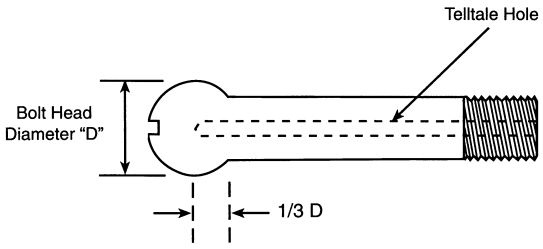
Reference 230.38(b)
Drawing 10

ARRANGEMENT OF TELLTALE HOLE IN REDUCED-BODY STAYBOLT



Reference 230.41(b)
Drawing 11

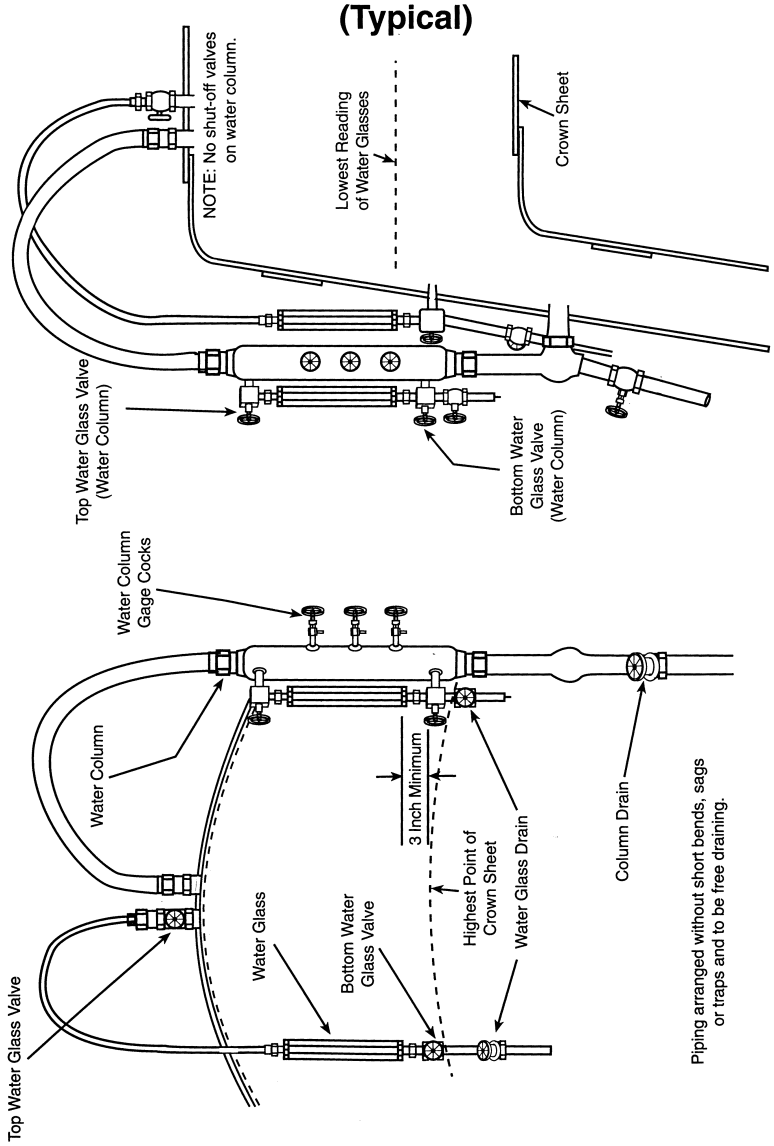
ARRANGEMENT OF TELLTALE HOLE IN HOLLOW FLEXIBLE STAYBOLT



Minimum Telltale Hole Depth into Bolt Head
To Equal 1/3 of Bolt Head Diameter (1/3 D)

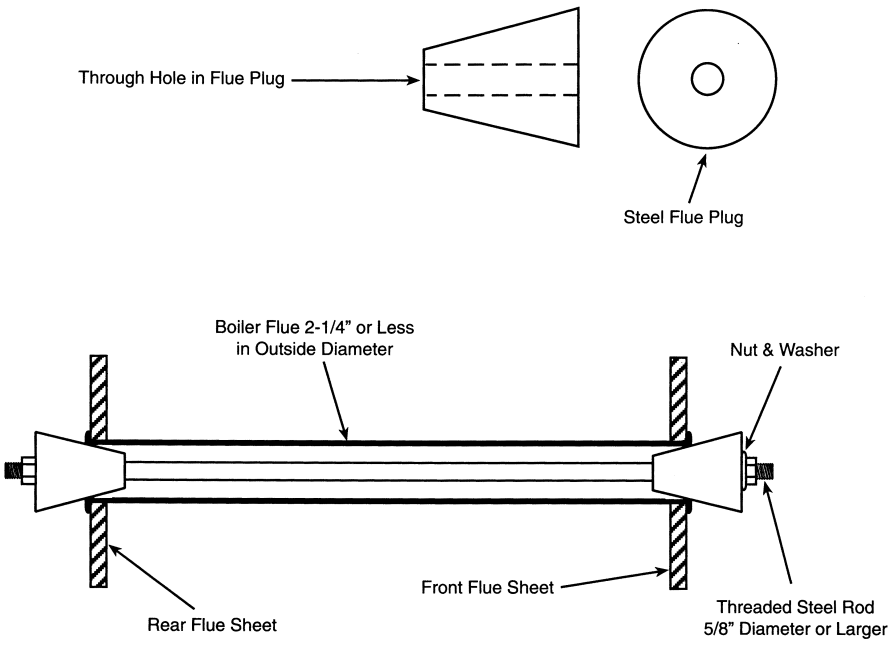
Reference 230.51
Drawing 12

GENERAL ARRANGEMENT OF WATER GLASS AND WATER COLUMN VALVES (Typical)



Reference 230.58(b)
Drawing 13

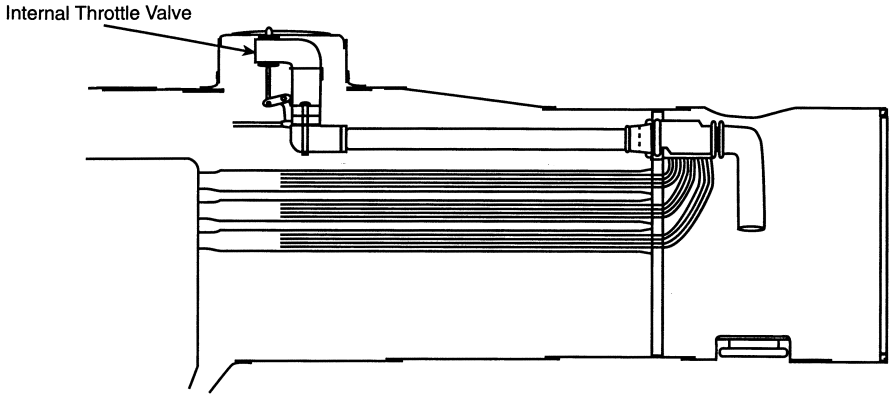
INSTALLATION OF FLUE PLUG



Reference 230.62
Drawing 14

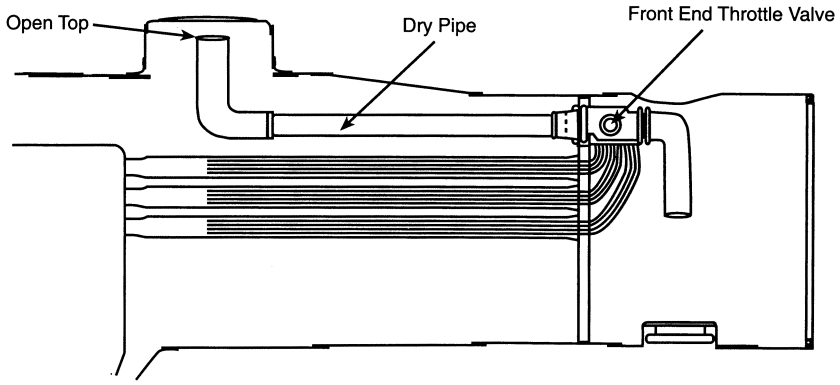
DRY PIPE

Arrangement of Dry Pipe Subject to Pressure



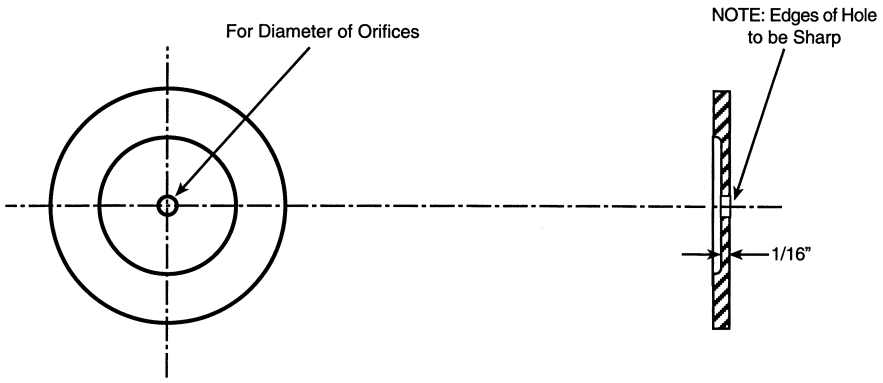
Reference 230.62
Drawing 15

Arrangement of Dry Pipe Not Subject to Pressure



Reference 230.71(b)
Drawing 16

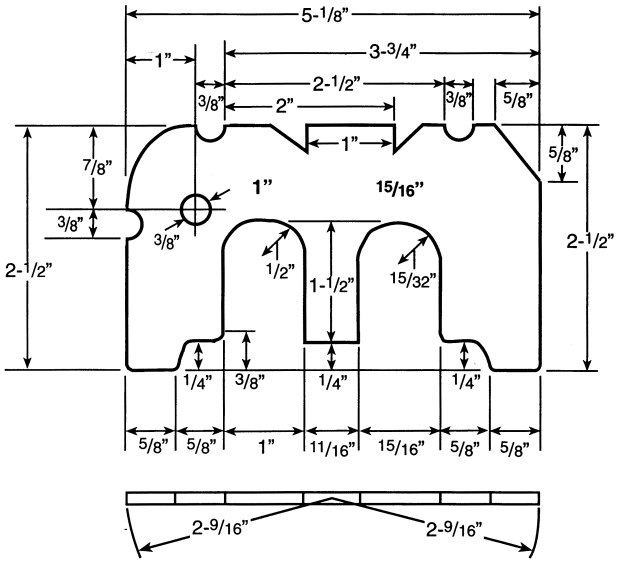
ORIFICE



Reference 230.113
Drawing 17

WHEEL DEFECT GAUGE

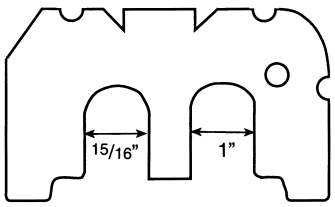
This gauge to be used in determining flat spots, worn flanges, and broken rims.



Reference 230.113
Drawing 18

WHEEL DEFECT GAUGE

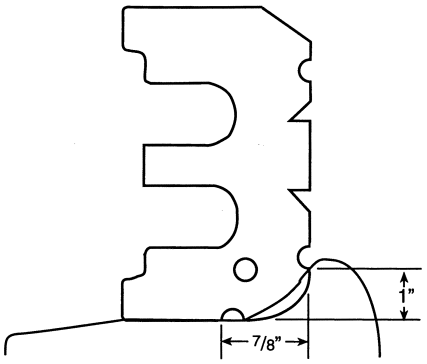
Method of gauging worn Flanges.



Reference 230.113
Drawing 19

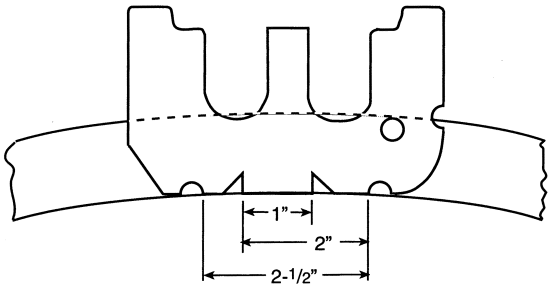
WHEEL DEFECT GAUGE

Method of gauging worn flanges.



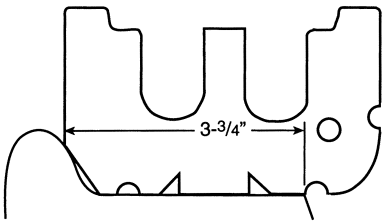
Reference 230.113
Drawing 20

Method of gauging shelled and flat spots.



Reference 230.113
Drawing 21

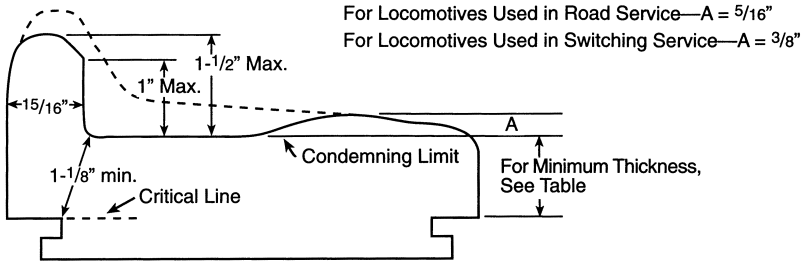
Method of gauging broken rims.



Reference 230.112
Drawing 22

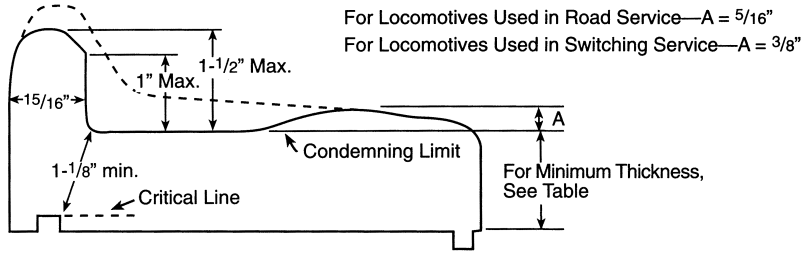
STEEL TIRE

Retaining ring type fastening. Driving and trailing wheels.



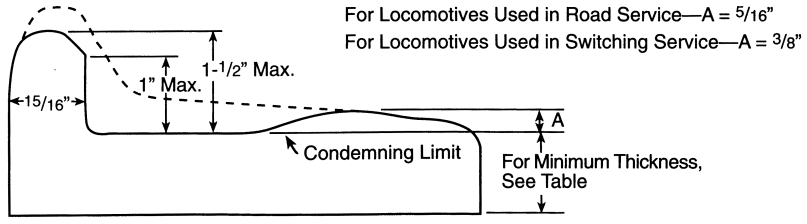
Reference 230.112
Drawing 23

Shrinkage fastening with shoulder and retaining segments. Driving and trailing wheels.



Reference 230.112
Drawing 24

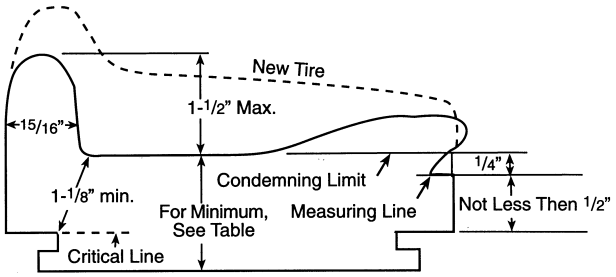
Shrinkage fastening. Driving and trailing wheels.



Reference 230.112
Drawing 25

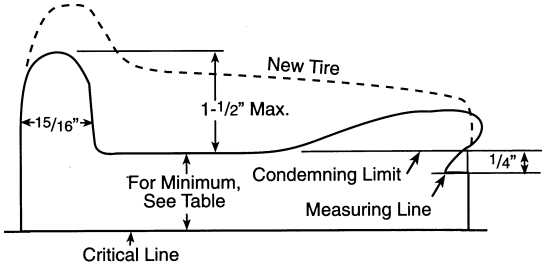
STEEL TIRE

Retaining ring type fastening. Minimum thickness for steel tires. Engine and tender.



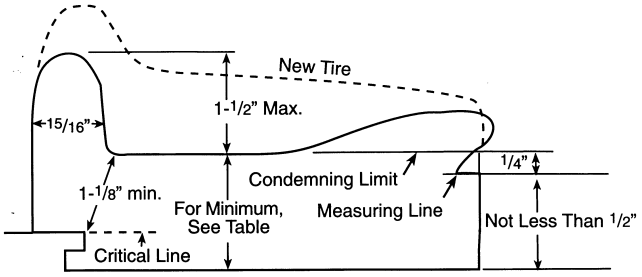
Reference 230.112
Drawing 26

Shrinkage fastening only. Minimum thickness for steel tires. Engine and tender.



Reference 230.112
Drawing 27

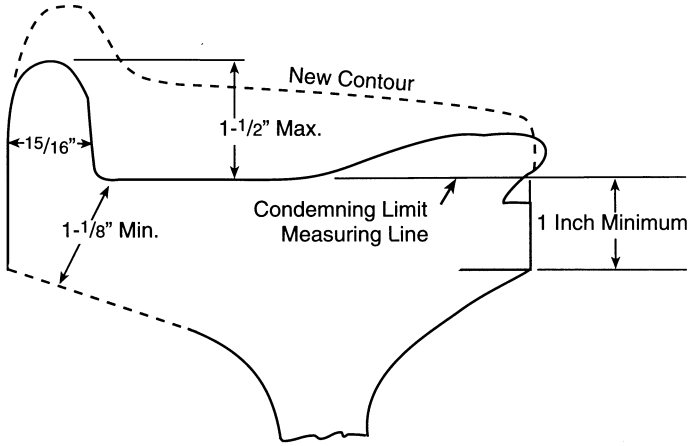
Retaining ring fastening. Minimum thickness for steel tires. Engine and tender.



Reference 230.113(j)
Drawing 28

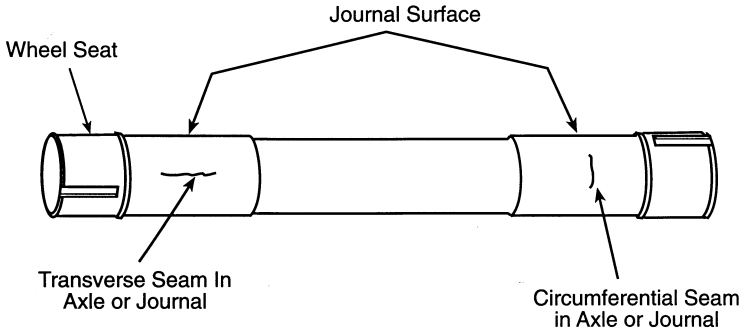
STEEL WHEELS

Minimum thickness of rim. Engine and tender truck wheels.



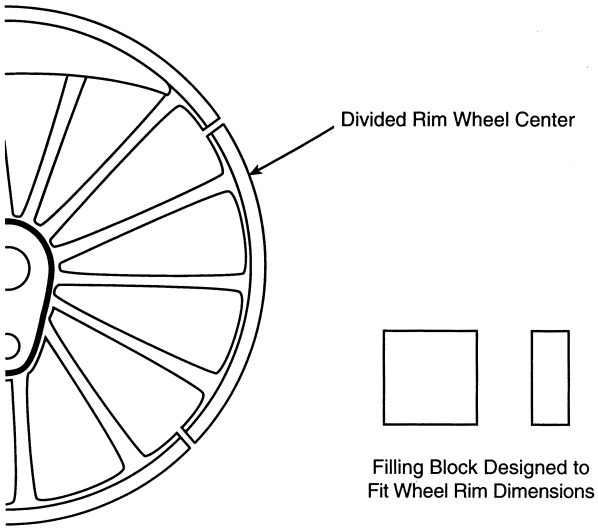
Reference 230.98
Drawing 29

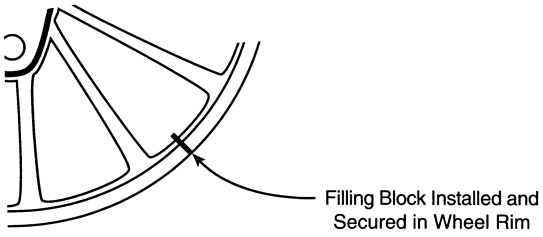
SEAMS IN AXLES



Reference 230.114(a)
Drawing 30

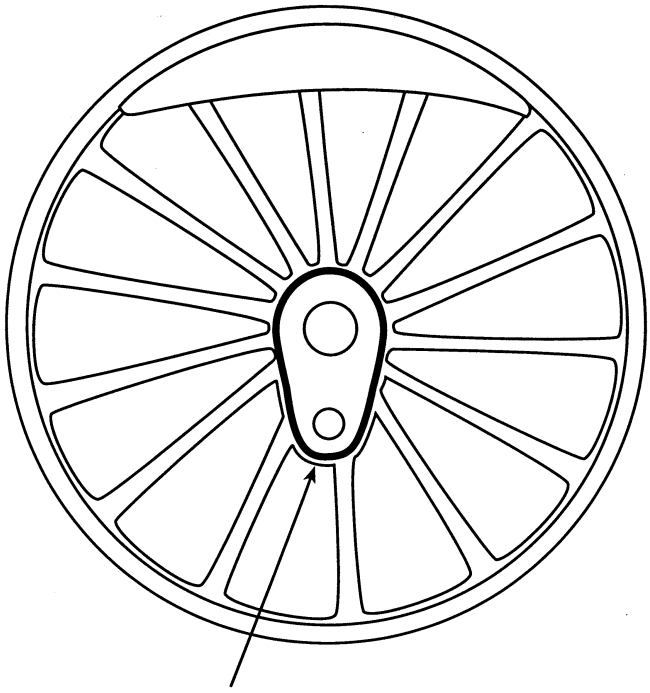
FILLING BLOCK FOR DIVIDED-RIM WHEEL CENTER





Reference 230.114(c)
Drawing 31

BANDED WHEEL HUB



APPENDIX C TO PART 230—FRA INSPECTION FORMS

Appendix C - FRA Inspection Forms

Form No. 1 **31 and 92 Service Day Inspection Report**

Date of Inspection_____ Owner_____ Operator_____ Locomotive Initials_____ Locomotive No._____

31 and 92 Service Day Requirements

Instructions: Non-complying conditions shall be repaired and this report approved before the locomotive is returned to service. Where condition is called for, enter either: **(1) Good -** No defects which could be discovered by a reasonable inspection; **(2) Fair -** Functioning less than optimally but safe and suitable and not in violation of the regulations; or **(3) Poor -** Not in compliance with the regulations. In any case N/A means - not applicable.

Was boiler washed?_____
Were water gauge and valve passages cleaned?_____
Were gauge cock passages cleaned?_____
Were all washout plugs removed and inspected?_____
Were arch tubes, circulators, siphons and water bar tubes cleaned and inspected?_____
Were fusible plugs removed, cleaned & inspected?_____
Were staybolts hammer tested?_____
Were all broken staybolts replaced?_____
Were steam leaks repaired?_____
Condition of draft system and draw gear._____
Condition of running gear._____
Condition of driving gear._____
Condition of spring/equalizing system._____
Condition of tender running gear._____
Condition of brake equipment._____
Were injectors tested and in good condition?_____
Was feedwater pump tested and in good condition?_____

92 Service Day Requirements

Date of previous 92 Service Day Inspection_____
Safety relief valves pop at_____psi_____psi_____psi
Were all steam gauges tested?_____
Were all air brake gauges tested?_____
Were steam gauge siphon pipe(s) cleaned?_____
Were tubular water glasses renewed?_____
Were air compressor(s) orifice tested?_____
Was main reservoir tested for leakage?_____
Were brake cylinders tested for leakage?_____
Was tender tank entered and inspected?_____
If no 92 Service Day Inspection is done, enter number of service days used since last 92 Service Day Insp._____

_____ INSPECTOR

_____ INSPECTOR

The above work has been performed and the report is approved._____ OFFICER IN CHARGE

Form No. 2

Daily Locomotive Inspection Report

Date of Inspection_____ Owner_____ Operator_____ Locomotive Initials_____ Locomotive No._____

Instructions: Non-complying conditions shall be repaired and this report approved before locomotive is returned to service. This report shall be filed even if no non-complying conditions are reported, however it does not have to be approved before the locomotive is returned to service if no non-complying conditions are reported. Locomotive, including its tender and appurtenances, shall be inspected each day it is offered for use.

Repairs needed:	**Repairs done by:**

CONDITION OF WATER GLASSES:_____ _____

CONDITION OF AIR COMPRESSOR:_____

CONDITION OF GAUGE COCKS:_____

MAIN RESERVOIR PRESS.: HP_____**psi, LP**_____**psi**

CONDITION OF INJECTORS / PUMPS:_____

BRAKE PIPE PRESSURE:_____ _____**psi**

BOILER SAFETY VALVE LIFTS AT:_____**psi**

LOCOMOTIVE BRAKE PIPE LEAKAGE:_____**lbs. per minute**

SEATS AT:_____**psi**

CONDITION OF BRAKES:_____

CONDITION OF PISTON ROD AND VALVE STEM PACKING_____

CONDITION OF SANDERS:_____

Where condition is called for enter:

Good - No defects which could be discovered by a reasonable inspection.
Fair - Functioning less than optimally but is in safe and suitable condition, and not in violation of the rules.
Poor - Not in compliance.
N/A - Not applicable.

Inspector's signature:_____ **Occupation:**_____

The above work has been performed, except as noted, and the report is **approved by:**_____

_____ **Occupation**
_____ **Date**

Approved

Note: Additional items may be added to this form if desired.

Form No. 3 **Annual Inspection Report**

Date of Inspection_____ Owner_____ Operator_____ Locomotive Initials_____ Locomotive No._____

Instructions: Non-complying conditions shall be repaired and this report approved before the locomotive is returned to service. Where condition is called for, enter either: **(1) Good -** No defects which could be discovered by a reasonable inspection; **(2) Fair -** Functioning less than optimally but safe and suitable and not in violation of the regulations; or **(3) Poor -** Not in compliance with the regulations. In any case N/A means - not applicable.

Boiler hydrostatically tested to _____psi, at a water temperature of _____degrees F.

Was boiler washed?_____
Were water gauge and valve passages cleaned?_____
Were gauge cock passages cleaned?_____
Were all washout plugs removed and inspected?_____
Were arch tubes, circulators, siphons and water bar tubes cleaned and inspected?_____
Thickness of arch tubes_____; Water bar tubes_____
Dry pipe thickness_____;Circulator thickness_____
Were water column passages cleaned and inspected?_____
Was boiler entered and inspected?_____
Were drilled flexible staybolt telltale holes tested?_____
Were staybolts hammer tested?_____
Were all broken staybolts replaced?_____
Were longitudinal lap seams inspected?_____
Was smoke box entered and inspected?_____
Safety relief valves pop at_____psi_____psi_____psi
Were injectors tested and in good condition?_____
Was feedwater pump tested and in good condition?_____
Were all steam gauges tested?_____

Were steam gauge siphon pipe(s) cleaned?_____
Were steam leaks repaired?_____
Were tubular water glasses renewed?_____
Were fusible plugs removed, cleaned & inspected?_____
Flexi caps removed on (date)_____
Were all air brake gauges tested?_____
Main reservoir hydro_____psi, hammer_____ NDE_____, Drilled_____
Were brake cylinders tested for leakage._____
Was main reservoir tested for leakage._____
Were air compressor(s) orifice tested?_____
Condition of driving gear._____
Condition of running gear._____
Condition of draft system and draw gear._____
Condition of spring/equalizing system._____
Condition of brake equipment._____
Condition of tender running gear._____
Was tender tank entered and inspected?_____

_____ INSPECTOR

_____ INSPECTOR

The above work has been performed and the report is approved._____ OFFICER IN CHARGE

Locomotive Air Brake Cleaning, Testing and Inspection Record

EQUIPMENT	SERVICE PERIOD	Previous Inspection	Current Annual Date	Inspection Date	Inspection Date	Inspection Date	Inspection Date	Notes
AIR COMPRESSOR ORIFICE TEST	92 service day							
AIR GAUGES	92 service day							
MAIN RESERVOIR LEAKAGE	92 service day							
BRAKE CYLINDER LEAKAGE	92 service day							
FILTERS	Annual Inspection							
DIRT COLLECTORS	Annual Inspection							
MAIN RESERVOIR HYDRO, HAMMER, NDE	Annual Inspection							
BRAKE VALVES	368 service days or second							

FRA Form 4

BOILER SPECIFICATION CARD

Locomotive No._____; **Boiler No.**_____; **Date built**_____
Boiler built by:_____
Owned by:_____
Operated by:_____
Type of boiler:_____; **Dome, where located:**_____

BOILER SURVEY DATA

Where **condition** is called for, use: **New** - New material at the time of the boiler survey; **Good** - Little or no wear and/or corrosion; **Fair** - Obvious wear and/or corrosion.

Boiler Shell Sheets

Material:	Type of Material (wrought iron, carbon steel, or alloy steel)	Carbon Content	Condition
1st course (front)	_____	_____	_____
2nd course	_____	_____	_____
3rd course	_____	_____	_____
Rivets	_____	n/a	n/a

Documentation of how material was determined shall be attached to this form.

Measurements:		At Seam	Thinnest		
Front flue sheet,	thickness	n/a	_____		
1st course,	thickness	_____,	_____,	ID_____,	ID_____
2nd course,	thickness	_____,	_____,	ID_____,	ID_____
3rd course,	thickness	_____,	_____,	ID_____,	ID_____

When courses are not cylindrical give ID at each end

Is boiler shell circular at all points?_____
If shell is flattened, state location and amount_____
Are all flattened areas of shell stayed adequately for the pressure allowed by this form?_____

Water Space at Mud Ring: Sides_____, Front_____, Back_____
Width of water space at sides of fire box measured at center line of boiler: Front_____, Back_____

Firebox and Wrapper Sheets

Firebox sheets:	Thickness	Material	Condition
Rear flue sheet	_____	_____	_____
Crown	_____	_____	_____
Sides	_____	_____	_____
Door	_____	_____	_____
Combustion chamber	_____	_____	_____
Inside throat	_____	_____	_____
Wrapper sheets:			
Throat	_____	_____	_____
Back head	_____	_____	_____
Roof	_____	_____	_____
Sides	_____	_____	_____

Steam Dome

Dome is made of _____pieces (not including seam welts, if any), Top opening diameter_____
Middle cylindrical portion - ID_____ , Opening in boiler shell, longitudinally - _____

Dome sheets:	Thickness	Material	Condition
Base	_____	_____	_____
Middle cylindrical portion	_____	_____	_____
Top	_____	_____	_____
Lid	_____	_____	_____
Boiler shell liner for steam dome opening:	_____	_____	_____

Is liner part of longitudinal seam?_____

Arch Tubes, Flues, Circulators, Thermic Siphons, Water Bar Tubes, Superheaters, and Dry Pipe

Arch tubes: OD_____, wall thickness_____; number _____; condition_____

Flues:
OD_____, wall thickness_____, length_____; number_____; condition_____
OD_____, wall thickness_____, length_____; number_____; condition_____
OD_____, wall thickness_____, length_____; number_____; condition_____

Circulators: OD_____, wall thickness_____; number _____; condition_____

Thermic siphons: number_____; plate thickness_____; condition_____
neck OD_____, neck thickness_____; condition_____

Water bar tubes: OD_____, wall thickness_____

Superheater units directly connected to boiler with no intervening valve:
Type_____, Tube OD_____, wall thickness_____; number_____; condition_____

Dry pipe subject to pressure:
OD_____, wall thickness_____, material_____; condition_____

Stay Bolts, Crown Bar Rivets, and Braces

Stay bolts:
Smallest crown stay diameter_____, avg. spacing_____X_____; condition_____
Smallest stay bolt diameter_____, avg. spacing_____X_____ ; condition_____
Smallest combustion chamber stay bolt dia._____,
avg. spacing_____X_____; condition_____

Measurement at smallest diameter

Crown bar bolts & rivets:
Roof sheet rivets, smallest dia._____, ave. spacing_____X_____; condition_____
Roof sheet bolts, smallest dia._____, ave. spacing_____X_____; condition_____
Crown sheet rivets, smallest dia._____, ave. spacing_____X_____; condition_____
Crown sheet bolts, smallest dia._____, ave. spacing_____X_____;condition_____

Braces:			Total Cross Sectional Area of Braces	
	Number	Total Area Stayed	Actual	Equivalent Direct Stay
Backhead	_____	_____	_____	_____
Throat sheet	_____	_____	_____	_____
Front tube sheet	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Safety Valves, Heating Surface, and Grate Area

Safety valves: Total number of safety valves on locomotive_____

Valve Size	Manufacturer	No. valves of this size and manufacture
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Heating Surface:

Heating surface, as part of a circulating system in contact on one side with water or wet steam being heated and on the other side with gas or refractory being cooled, shall be measured on the side receiving heat.

Firebox and Combustion Chamber	_____ square feet
Flue Sheets (less flue ID areas)	_____ square feet
Flues	_____ square feet
Circulators	_____ square feet
Arch Tubes	_____ square feet
Thermic Siphons	_____ square feet
Water Bar Tubes	_____ square feet
Superheaters (front end throttle only)	_____ square feet
Other	_____ square feet
Total Heating Surface	_____ square feet

Grate area:_____square feet

Water Level Indicators, Fusible Plugs, and Low Water Alarms

Height of lowest reading of gauge glasses above crown sheet:_____ _____

Height of lowest reading of gauge cocks above crown sheet:_____

Is boiler equipped with fusible plug(s)? _____, number_____

Is boiler equipped with low water alarm(s)? _____, number_____

Calculations

Staybolt stresses:

Stay bolt under greatest load, maximum stress _____psi
Location_____

Crown stay, crown bar rivet, or crown bar bolt under greatest load, max. stress _____psi
Location_____

Combustion chamber stay bolt under greatest load, maximum stress _____psi
Location_____

Braces:

Round or rectangular brace under greatest load, maximum stress _____psi
Location_____

Gusset brace under greatest load, maximum stress _____psi
Location_____

Shearing stress on rivets:

Greatest shear stress on rivets in longitudinal seam _____psi
Location (course #)_____ ; Seam Efficiency_____

Boiler shell plate tension:

Greatest tension on net section of plate in longitudinal seam _____psi
Location (course #)_____ ; Seam Efficiency_____

Boiler plate and components, minimum thickness required @ tensile strength:

Front tube sheet	_____@_____	Rear flue sheet	_____@_____
1st course at seam	_____@_____	1st course not at seam	_____@_____
2nd course at seam	_____@_____	2nd course not at seam	_____@_____
3rd course at seam	_____@_____	3rd course not at seam	_____@_____
Roof sheet	_____@_____	Crown sheet	_____@_____
Side wrapper sheets	_____@_____	Firebox side sheets	_____@_____
Back head	_____@_____	Door sheet	_____@_____
Throat sheet	_____@_____	Inside throat sheet	_____@_____
Combustion chamber	_____@_____	Dome, top	_____@_____
Dome, middle	_____@_____	Dome, base	_____@_____
Arch tubes	_____@_____	Dome, lid	_____@_____
Water bar tubes	_____@_____	Thermic siphons	_____@_____
Dry pipe	_____@_____	Circulators	_____@_____

Notes. **1. If tensile strength used is greater than 50,000 psi for steel or greater than 45,000 psi for wrought iron, supporting documentation must be furnished.**

2. Any shell dimension less than 1/4" in thickness may not be adequate for support of or by other structures, particularly where threads or staybolts are concerned. Applicable codes should be consulted.

Boiler Steam Generating Capacity: _____pounds per hour

The following may be used as a guide for estimating steaming capacity:

Pounds of Steam Per Hour Per Square Foot of Heating Surface:

Hand fired	8 lbs. per hr.
Stoker fired	10 lbs. per hr.
Oil, gas or pulverized fuel fired	14 lbs. per hr.

Record of Alterations

Description of Alteration	Date of Alteration

Record of Waivers

Waiver No.	Section No. Affected	Scope and Content of Waiver

Calculations done by:_____; Verified by:_____

Data used to verify the foregoing specifications is current and accurate. Based upon the information contained in this document and all necessary calculations, this boiler of Locomotive (Initial & number)_____ is safe for a working pressure of _____psi.

_____ Date_____; _____ Date_____

Locomotive Owner **Locomotive Operator**

Make working sketch here or attach drawing of longitudinal and circumferential seams used in shell of boiler, indicating on which courses used and give calculated efficiency of weakest longitudinal seam.

Form No. 5 **Locomotive Service Day Record**

Locomotive Initial and No.___________________ **owned by** ___________________________________ **and operated by**_________________________________was placed in service following a 1472 Service Day Inspection on (start date)__________. This locomotive shall not be operated after (date)_________, or it shall not be operated after it has accumulated 1472 service days from the above start date, whichever comes first, at which time it shall be due for a 1472 Service Day Inspection.

	Year															
Serv. days since last insp.																
Annual Date																
Serv. days since last insp.																
31 Service Day Date																
Serv. days since last insp.																
31 Service Day Date																
Serv. days since last insp.																
92 Service Day Date																
Serv. days since last insp.																
31 Service Day Date																
Serv. days since last insp.																
31 Service Day Date																
Serv. days since last insp.																
92 Service Day Date																
Serv. days since last insp.																
31 Service Day Date																
Serv. days since last insp.																
31 Service Day Date																
Serv. days since last insp.																
92 Service Day Date																
Serv. days since last insp.																
31 Service Day Date																
Serv. days since last insp.																
31 Service Day Date																
Serv. days since last insp.																
Annual Date																
TOTAL																

A copy of this record shall be filed with the Regional Administrator after 31 December and prior to 31 January of each year.

Signed_____________________________**Officerin Charge**

FRA Form 19

Report of
ALTERATION ☐
or
Welded or Riveted REPAIR ☐

Locomotive Initials_____ **Locomotive No.**_____; **Boiler No.**_____;

Owned by _____

Operated by _____

Date work completed_____

Description of work:_____

Stress Calculations:

Remarks:_____

Attach drawings used in the repair or alteration or make drawings on back of this form.

Work done by:_____;

Certified by:_____

[64 FR 62865, Nov. 17, 1999, as amended at 70 FR 41996, July 21, 2005]

APPENDIX D TO PART 230—CIVIL PENALTY SCHEDULE

Section		Violation	Willful violation
	Subpart A—General		
230.11	Repair of non-complying conditions:		
	(a) Failure to repair non-complying steam locomotive prior to use in service	$1,000	$2,500
	(b) Failure of owner and/or operator to approve repairs made prior to use of steam locomotive	1,000	1,500
230.12	Movement of non-complying steam locomotive:	(1)	(1)
230.13	Daily inspection:		
	(a) (b):		
	(1) Inspection overdue	1,500	3,000
	(2) Inspection not performed by qualified person	1,000	1,500
	(c) Inspection report not made, improperly executed or not retained	1,000	1,500
230.14	Thirty-one service day inspection:		
	(a):		
	(1) Inspection overdue	1,500	3,000
	(2) Inspection not performed by qualified person.		
	(b) Failure to notify FRA	1,000	1,500
	(c) Inspection report not made, improperly executed, not properly filed	1,000	1,500
230.15	Ninety-two service day inspection:		
	(a):		
	(1) Inspection overdue	1,500	3,000
	(2) Inspection not performed by qualified person	1,000	1,500
	(b) Inspection report not made, improperly executed, not properly filed	1,000	1,500
230.16	Annual inspection:		
	(a):		
	(1) Inspection overdue	1,500	3,000
	(2) Inspection not performed by qualified person	1,000	1,500
	(b) Failure to notify FRA	1,000	1,500
	(c) Inspection report not made, improperly executed, not properly filed	1,000	1,500
230.17	One thousand four hundred seventy-two service day inspection:		
	(a):		
	(1) Inspection overdue	1,500	3,000
	(2) Inspection not performed by qualified person	1,250	2,000
	(b) Inspection report not made, improperly executed, not properly maintained, not properly filed	1,000	1,500
230.18	Service days:		
	(a) Service day record not available for inspection	1,000	1,500
	(b) Failure to file service day report with FRA Regional Administrator	1,000	1,500
	(c) Failure to complete all 1,472 service day inspection items prior to returning retired steam locomotive to service	1,500	3,000
230.19	Posting of forms:		
	(a) FRA Form No. 1:		
	(1) FRA Form No. 1 not properly filled out	1,000	1,500
	(2) FRA Form No. 1 not properly displayed	1,000	1,500
	(b) FRA Form No. 3:		
	(1) FRA Form No. 3 not properly filled out	1,000	1,500
	(2) FRA Form No. 3 not properly displayed	1,000	1,500
230.20	Alteration and repair reports:		
	(a) Alterations:		
	(1) Failure to properly file FRA Form No. 19 with FRA Regional Administrator	1,000	1,500
	(2) FRA Form No. 19 not properly filled out	1,000	1,500
	(3) FRA Form No. 19 not properly maintained	1,000	1,500
	(b) Repairs to unstayed portions of the boiler:		
	(1) FRA Form No. 19 not properly filled out	1,000	1,500
	(2) FRA Form No. 19 not properly maintained	1,000	1,500
	(c) Repairs to stayed portions of the boiler:		
	(1) FRA Form No. 19 not properly filled out	1,000	1,500
	(2) FRA Form No. 19 not properly maintained	1,000	1,500
230.21	Failure to properly document steam locomotive number Change	1,000	1,500
	Subpart B—Boilers and Appurtenances		
230.22	Failure to properly report accident resulting from failure of steam locomotive boiler or part or appurtenance thereof	1,500	2,500
230.23	Responsibility for general construction and safe working pressure:		
	(a) Failure to properly establish safe working pressure for steam locomotive boiler	5,000	10,000
	(b) Placing steam locomotive in service before safe working pressure for boiler has been established	5,000	10,000
230.24	Maximum allowable stress values on boiler components:		
	(a) Use of materials not of sufficient tensile strength	1,000	2,000
	(b) Use of a safety factor value of less than 4 when using the code of original construction in boiler calculations	2,000	4,000
230.25	Maximum allowable stresses on stays and braces:		

Section	Violation	Willful violation
(a) Exceeding allowable stress values on fire box and/or combustion chamber	1,000	2,000
(b) Exceeding allowable stress values on round, rectangular or gusset braces	1,000	2,000
230.29 Inspection and repair:		
(a):		
(1) Failure of owner and/or operator to inspect and repair any steam locomotive boiler and/or appurtenance under control thereof	1,500	3,000
(2) Failure to remove steam locomotive from service when considered necessary to do so	2,500	5,000
(b):		
(1) Failure of perform repairs in accordance with accepted industry standards	2,000	4,000
(2) Owner and/or operator returning steam locomotive boiler and/or appurtenances to service before they are in good condition and safe and suitable for service	2,000	4,000
230.30 Lap-joint seam boilers, Failure to properly inspect	2,000	4,000
230.31 Flues to be removed:		
(a):		
(1) Failure to remove all flues when inspecting boiler	1,500	3,000
(2) Failure to enter boiler and clean and inspect	1,500	3,000
(b) Failure to remove superheater flues when deemed necessary to do so	1,000	2,000
230.32 Time and method of inspection:		
(a) Failure to perform 1,472 service day inspection when required to do so	1,500	3,000
(b) Failure to properly inspect boiler during 1,472 service day inspection	1,500	3,000
230.33 Welded repairs and alterations:		
(a) Failure to obtain permission before welding on unstayed portions of boiler containing alloy or carbon steel with carbon content over .25 percent carbon	1,500	3,000
(b) Failure to perform welding on unstayed portions of boiler containing carbon steel not exceeding .25 percent carbon in accordance with a nationally accepted standard for boiler repairs	1,500	3,000
(c):		
(1) Failure to submit written request for approval before performing weld buildup on wasted areas of unstayed boiler surfaces that exceed 100 square inches or the smaller of 25 percent of minimum required wall thickness or ½ inch	1,500	3,000
(2) Repairing wasted sheets	1,500	3,000
230.34 Riveted repairs and alterations:		
(a) Failure to obtain approval before making riveted alterations on unstayed portions of the boiler; failure to do riveting in accordance with established railroad practices or accepted national standards for boiler repairs	1,500	3,000
(b) Failure to perform riveted repairs on unstayed boiler portions in accordance with established railroad practices or accepted national standards for boiler repairs	1,500	3,000
(c) Failure to perform riveted repairs on stayed boiler portions in accordance with established railroad practices or accepted national standards for boiler repairs	1,000	2,000
230.35 Failure to raise temperature of steam locomotive boiler to 70 degrees F. before applying hydrostatic pressure to the boiler	1,000	2,000
230.36 Hydrostatic testing of boilers:		
(a) Failure to perform hydrostatic test of boiler as required	1,500	3,000
(b) Failure to properly perform hydrostatic test	1,500	3,000
(c) Failure to properly inspect boiler after conducting hydrostatic test above MAWP	1,500	3,000
230.37 Failure to perform proper steam test or inspection of boiler after completion of repair or alteration to boiler	1,000	2,000
230.38 Telltale holes:		
(a) Failure to have telltale holes as required in staybolts	1,000	2,000
(b) Failure to have proper telltale holes in reduced body staybolts	1,000	2,000
(c) Failure to keep telltales holes when so required	1,000	2,000
230.39 Broken staybolts:		
(a) Boiler in service with excess number of broken staybolts	1,500	3,000
(b) Failure to replace staybolts when required to do so; to properly replace staybolts when so required; to inspect adjacent staybolts when replacing broken staybolts	1,500	3,000
(c) Failure to count leaking, plugged, or missing telltale holes as broken staybolts	1,500	3,000
(d) Closing telltale holes by prohibited means	1,500	3,000
230.40 Time and method of staybolt testing:		
(a) Failure to hammer test staybolts when so required	1,000	2,000
(b) Failure to properly hammer test staybolts	1,000	2,000
230.41 Flexible staybolts with caps:		
(a) Failure to inspect flexible staybolts as required	1,000	2,000
(b) Failure to replace broken flexible staybolts; failure to close inner ends of telltale holes as required	1,000	2,000
(c) Failure to report removal of flexible staybolts caps and other tests on FRA Form No. 3 when so required	1,000	2,000
(d) Failure to remove staybolt caps or otherwise test when FRA inspector or steam locomotive owner and/or operator consider it necessary to do so	1,000	2,000
230.42 Failure to have accurate boiler steam gauge where engine crew can conveniently read	2,000	4,000
230.43 Failure to have gauge siphon of proper capacity on steam gauge supply pipe; failure to properly clean, maintain the steam gauge supply pipe	1,000	2,000

Section	Violation	Willful violation
230.44 Failure to test steam gauge when so required	1,000	2,000
230.45 Failure to properly test and/or set steam gauge	1,000	2,000
230.46 Failure to attach to boiler backhead metal badge plate showing allowable steam pressure	1,000	1,500
230.47 Boiler Number:		
(a) (b) (c) Failure to stamp builder's number on boiler when number is known	1,000	1,500
230.48 Number and capacity of safety relief valves:		
(a) Failure to equip steam locomotive boiler with proper safety relief valves	2,500	5,000
(b) Failure to provide additional safety relief valve capacity when so required	3,000	6,000
230.49 Setting of safety relief valves:		
(a) Safety relief valve(s) set and/or adjusted by person not competent to do so	2,500	5,000
(b) Safety relief valve(s) not set to open at prescribed pressure(s)	2,500	5,000
(c) Safety relief valve(s) not properly set	3,000	6,000
(d) Set pressure of lowest safety relief valve not properly indicated	1,000	2,000
230.50 Failure to test and adjust safety relief valves when required to do so	1,500	3,000
230.51 Failure to equip steam locomotive boiler with at least 2 properly installed water glasses	1,000	2,000
230.52 Failure to properly equip water glasses	2,000	4,000
230.53 Failure to properly clean water glass valves and/or gauge cocks when required to do so	1,000	2,000
230.54 Testing and maintenance:		
(a) Failure to properly test water glasses and/or gauge cocks	1,000	2,000
(b) Failure to properly maintain gauge cocks, water column drain valves, and/or water glass valves	1,500	3,000
230.55 Tubular type water and lubricator glasses and shields:		
(a) Failure to renew tubular type water glasses as required	1,000	2,000
(b) Failure to properly shield tubular water glasses and/or lubricator glasses	1,000	2,000
(c) Failure to properly locate and/or maintain water glasses and/or water glass shields	1,000	2,000
230.56 Failure to equip water glass with suitable lamp	1,000	2,000
230.57 Injectors and feedwater pumps:		
(a) Failure to equip steam locomotive with proper means for delivering water to the boiler	3,000	6,000
(b) Failure to properly test and/or maintain injectors, feedwater pumps, boiler checks, delivery pipes, feed water pipes, tank hose, tank valves	2,500	5,000
(c) Failure to properly brace injectors, feedwater pumps, and/or associated piping	1,000	2,000
230.58 Flue plugs:		
(a) Plugging flue plugs when not otherwise permitted	1,000	2,000
(b) Improperly plugging flue plugs, when otherwise permitted	1,000	2,000
230.59 Failure to remove and properly clean fusible boiler plugs when required to do so; failure to properly note removal	1,500	3,000
230.60 Time of washing:		
(a) Failure to thoroughly wash boiler when required to do so	1,000	2,000
(b) Failure to remove washout plugs, arch tube plugs, thermic siphon plugs, circulator plugs, water bar plugs when washing locomotive boiler	1,500	3,000
(c) Failure to examine and/or properly maintain washout plugs washout plug sleeves, threaded openings	1,500	3,000
(d) Failure to clean fusible plugs when required to do so	1,500	3,000
230.61 Arch tubes, water bar tubes, circulators and thermic siphons:		
(a) Failure to clean, wash, inspect arch tubes, water bar tubes, circulators and thermic siphons as required	1,000	2,000
(b) Failure to renew arch tubes, water bar tubes; failure to repair or renew circulators, thermic siphons when required	1,500	3,000
(c) Failure to properly inspect and/or replace as necessary arch tubes, water bar tubes, circulators	1,500	3,000
230.62 Failure to properly inspect and/or repair or replace as necessary dry pipes subject to pressure	2,500	5,000
230.63 Failure to properly inspect smoke box, steam pipes, pressure parts when required to do so	1,500	3,000
230.64 Failure to remove from service steam locomotive boiler leaking under lagging from condition which may reduce safety and/or repair the boiler before returning to service	1,500	3,000
230.65 Failure to keep steam locomotive boiler, piping, appurtenances in repair so steam does not obscure vision	1,000	2,000
230.66 Failure to properly oversee general design, construction, maintenance of steam locomotive(s) and tender(s)	1,000	2,000
230.67 Failure to ensure all steam locomotives and tenders are properly inspected and repaired and/or all defects are properly repaired and steam locomotive and/or tender are in good condition, safe and suitable for service before being returned to service	2,500	5,000
230.68 Failure to equip steam locomotive that operates in excess of 20 miles per hour over the general system with speed indicator maintained to ensure accurate functioning	1,000	1,500
230.69 Failure to equip steam locomotive with properly supported ash pan with operating mechanism that may be safely operated and securely closed	1,000	2,000
230.70 Safe condition:		
(a) Failure to perform proper pre-departure inspection when so required	1,000	2,000
(b) Failure to properly equip steam locomotive with brake pipe valve clearly identified as "Emergency Brake Valve"	1,000	2,000
230.71 Orifice testing of air compressors:.		
(a)(b):		
Failure to properly test and/or maintain air compressor(s) capacity	1,000	2,000

Section		Violation	Willful violation
230.72	Testing main reservoirs:		
	(a) Failure to properly test main reservoir(s) when required	1,000	2,000
	(b) Impermissibly or improperly drilling main reservoir	1,000	2,000
	(c) Impermissibly using NDE method to measure wall thickness of main reservoir	1,000	2,000
	(d) Failure to use appropriate method of NDE testing of wall thickness of welded or riveted longitudinal lap seam main reservoir(s); failure to withdraw main reservoir(s) from service when testing reveals insufficient wall thickness	1,500	3,000
230.73	Air gauges:		
	(a) Failure to equip steam locomotive with properly located air gauge(s) that are no more than 3 psi in error	1,000	1,500
	(b) Failure to test air gauge(s) when so required	1,000	1,500
	(c) Failure to properly test air gauge(s)	1,000	1,500
230.74	Failure to properly clean and/or test all air brake valves, related dirt collectors, filters when required to do so	1,000	1,500
230.75	Failure to properly stencil or display date of testing and cleaning and initials of shop or station performing work	1,000	1,500
230.76	Piston travel:		
	(a) Insufficient minimum piston travel	1,000	1,500
	(b) Excessive piston travel when steam locomotive is stationary	1,000	2,000
230.77	Foundation brake gear:		
	(a) Failure to properly maintain foundation brake gear	1,000	2,000
	(b) Foundation brake gear less than 2.5 inches above rail	1,000	2,000
230.78	Leakage:		
	(a):		
	(1) Failure to test for leakage from main reservoir or related piping as required	1,000	1,500
	(2) Failure to repair excessive leakage from main reservoir or related piping leakage	1,000	2,000
	(b) Failure to test for brake cylinder as required	1,000	1,500
	(c):		
	(1) Failure to test for leakage from steam locomotive brake pipe as required	1,000	2,000
	(2) Failure to repair excessive brake pipe leakage	1,000	2,000
230.79	Train signal system:		
	(1) Failure to test the train signal system or other form of on-board communication as required	1,000	1,500
	(2) Failure to repair train signal system or other on-board communication when not safe or suitable for service	1,000	1,500
230.80	Cabs:		
	(a) Steam locomotive cab not safe and suitable for service	1,000	2,000
	(b) Steam pipes: Construction, attachment	1,000	2,000
	(c) Oil-burning steam locomotive, cab-enclosed	1,000	1,500
230.81	Cab aprons:		
	(a) Cab apron, general provisions	1,000	1,500
	(b) Cab apron, insufficient width	1,000	1,500
230.82	Fire doors:		
	(a) Safe and suitable for service, general provisions	1,000	2,000
	(b) Construction and maintenance of mechanically operated fire doors	1,000	2,000
	(c) Construction and maintenance of hand-operated fire doors	1,000	2,000
230.83	Cylinder cocks:		
	(1) Failure to properly equip with cylinder cocks	1,000	1,500
	(2) Failure to properly maintain cylinder cocks	1,000	1,500
230.84	Sanders:		
	(1) Inoperable sanders	1,000	1,500
	(2) Failure to test sanders	1,000	1,500
230.85	Audible warning devices:		
	(a) General provisions	1,000	1,500
	(b) Sound level measurements, Failure to properly take	1,000	1,500
230.86	Required illumination:		
	(a) General provisions	1,000	1,500
	(b) Dimming device, Failure to properly equip with	1,000	1,500
	(c) Multiple locomotives, Failure of lead locomotive to display headlight	1,000	1,500
230.87	Cab lights: Failure to properly equip with	1,000	2,000
230.88	Throttles: Failure to properly maintain, equip	1,000	2,000
230.89	Reverse gear:		
	(a) General provisions	1,000	2,000
	(b) Air-operated power reverse gear	1,000	2,000
	(c) Power reverse gear reservoirs	1,000	2,000
230.90	Draw gear and draft systems:		
	(a) Maintenance and testing	1,000	1,500
	(b) Safety bars and chains, general	1,000	1,500
	(c) Safety bars and chains, minimum length	1,000	1,500
	(d) Lost motion between steam locomotive and tender	1,000	1,500
	(e) Spring buffers: Improper application, compression	1,000	1,500
230.91	Chafing irons: Improper application, maintenance	1,000	1,500

Section	Violation	Willful violation
230.92 Draw gear, draft systems: Improperly maintained, fastened	1,000	1,500
230.93 Pistons and piston rods:		
(a) Failure to properly inspect, maintain, renew	1,000	2,000
(b) Fasteners: Failure to keep tight, properly equip	1,000	2,000
230.94 Crossheads: Improperly maintained, excess clearance	1,000	2,000
230.95 Guides: Failure to securely fasten, properly maintain	1,000	2,000
230.96 Main, side, valve motion rods:		
(a) General	1,000	2,000
(b) Repairs.		
(1) Failure to make in accordance with accepted national standard	1,000	2,000
(2) Failure to submit written request for approval prior to welding	1,000	2,000
(c) Bearings and bushings	1,000	1,500
(d) Rod side motion: Excessive motion	1,000	1,500
(e) Oil, grease cups: Failure to securely fasten, properly equip	1,000	1,500
(f) Main rod bearings:		
(1) excessive bore	1,000	1,500
(2) excessive lost motion	1,000	1,500
(g) Side rod bearings, excessive bore	1,000	1,500
230.97 Crank pins:		
(a) General provisions	1,000	2,000
(b) Maintenance: Failure to maintain in safe, suitable condition	1,000	2,000
230.98 Driving, trailing, engine truck axles:		
(a) Condemning defects	1,000	2,000
(b) Journal diameter: Failure to stamp on end of axle	750	1,000
230.99 Tender truck axle: Insufficient diameter	1,000	2,000
230.100 Defects in tender truck axles and journals:		
(a) Tender truck axle condemning defects	1,000	2,000
(b) Tender truck journal condemning defects	1,000	2,000
230.101 Steam locomotive driving journal boxes:		
(a) Driving journal boxes: Failure to properly maintain	1,000	2,000
(b) Broken bearings: Failure to renew	1,000	2,000
(c) Loose bearings: Failure to repair or renew	1,000	2,000
230.102 Tender plain bearing journal boxes: Failure to repair	1,000	1,500
230.103 Tender roller bearing journal boxes: Failure to properly maintain	1,000	1,500
230.104 Driving box shoes and wedges: Failure to properly maintain	1,000	1,500
230.105 Lateral motion:		
(a) Condemning limits: Total lateral motion in excess of	1,000	1,500
(b) Limits exceeded, failure to demonstrate conditions require additional lateral motion	1,000	1,500
(c) Interferes with other parts of steam locomotive	1,000	1,500
230.106 Steam locomotive frame:		
(a) Failure to properly inspect and/or maintain	1,000	2,000
(b) Broken frames, not properly patched or secured	2,500	5,000
230.107 Tender frame and body:		
(a) Failure to properly maintain	1,000	1,500
(b) Height difference between tender deck and steam locomotive cab floor or deck excessive	1,000	1,500
(c) Gangway minimum width excessive	1,000	1,500
(d) Tender frame condemning defects	1,500	3,000
230.108 Steam locomotive leading and trailing trucks:		
(a) Failure to properly maintain	1,000	1,500
(b) Safety chain, suitable safety chain not provided	1,000	1,500
(c) Insufficient truck clearance	1,000	2,000
230.109 Tender trucks:		
(a):		
(1) Tender truck frames	1,000	2,000
(2) Tender truck center plate	1,000	2,000
(b) Tender truck bolsters: Failure to properly maintain	1,500	3,000
(c) Condemning defects, springs and/or spring rigging	1,000	2,000
(d) Truck securing arrangement: Not properly maintained	1,000	1,500
(e) Side bearings, truck centering devices	1,000	2,000
(f) Friction side bearings: Run in contact	1,000	2,000
(g):		
(1) Side bearings, failure to equip rear trucks with	1,000	2,000
(2) Insufficient clearance of	1,000	2,000
230.110 Pilots:		
(a) General provisions	1,000	1,500
(b) Clearance, insufficient or excessive	1,000	1,500
230.111 Spring rigging:		
(a) Arrangement of springs and equalizers	1,000	2,000
(b) Spring or spring rigging condemning defects	1,000	2,000
230.112 Wheels and tires:		
(a) Improperly Mounted, excess variance in axle diameter	1,500	3,000
(b) Out of gage	1,000	2,000

Section	Violation	Willful violation
(c) Flange distance variance, excessive	1,000	2,000
(d) Tire thickness, insufficient	1,000	2,000
(e) Tire width, insufficient	1,000	2,000
230.113 Wheels and tire defects:		
(1) Failure to repair	1,000	2,000
(2) Welding on, except as otherwise provided for	1,500	3,000
(a) Cracks or breaks in	1,000	2,000
(b) Flat spots	1,000	2,000
(c) Chipped flange	1,000	2,000
(d) Broken rim	1,000	2,000
(e) Shelled-out spots	1,000	2,000
(f) Seams	1,000	2,000
(g) Worn flanges, excessive wear	1,000	2,000
(h) Worn treads, excessive wear	1,000	2,000
(i) Flange height, insufficient or excessive	1,000	2,000
(j) Rim thickness, insufficient	1,000	2,000
(k) Wheel diameter, excessive variance	1,000	2,000
230.114 Wheel centers:		
(a) Filling blocks and shims	1,000	2,000
(b) Wheel center condemning limits, failure to repair	1,000	2,000
(c) Wheel center repairs	1,000	2,000
(d) Counterbalance maintenance	1,000	2,000
230.115 Feed water tanks:		
(a) General provisions	1,000	2,000
(b) Inspection frequency, failure to inspect as required	1,000	1,500
(c) Top of tender: Improperly maintained and/or equipped	1,000	1,500
230.116 Oil tanks:		
(1) Failure to properly maintain	2,500	5,000
(2) Failure to equip with complying safety cut-off device	5,000	7,500

[1] Failure to observe any condition for movement set forth in §230.12 will deprive the railroad of the benefit of the movement-for-repair provision and make the railroad and any responsible individuals liable for penalty under the particular regulatory section(s) concerning the substantive defect(s) present on the locomotive at the time of movement. Failure to comply with §230.12 will result in the lapse of any affected waiver.

PART 231—RAILROAD SAFETY APPLIANCE STANDARDS

Sec.